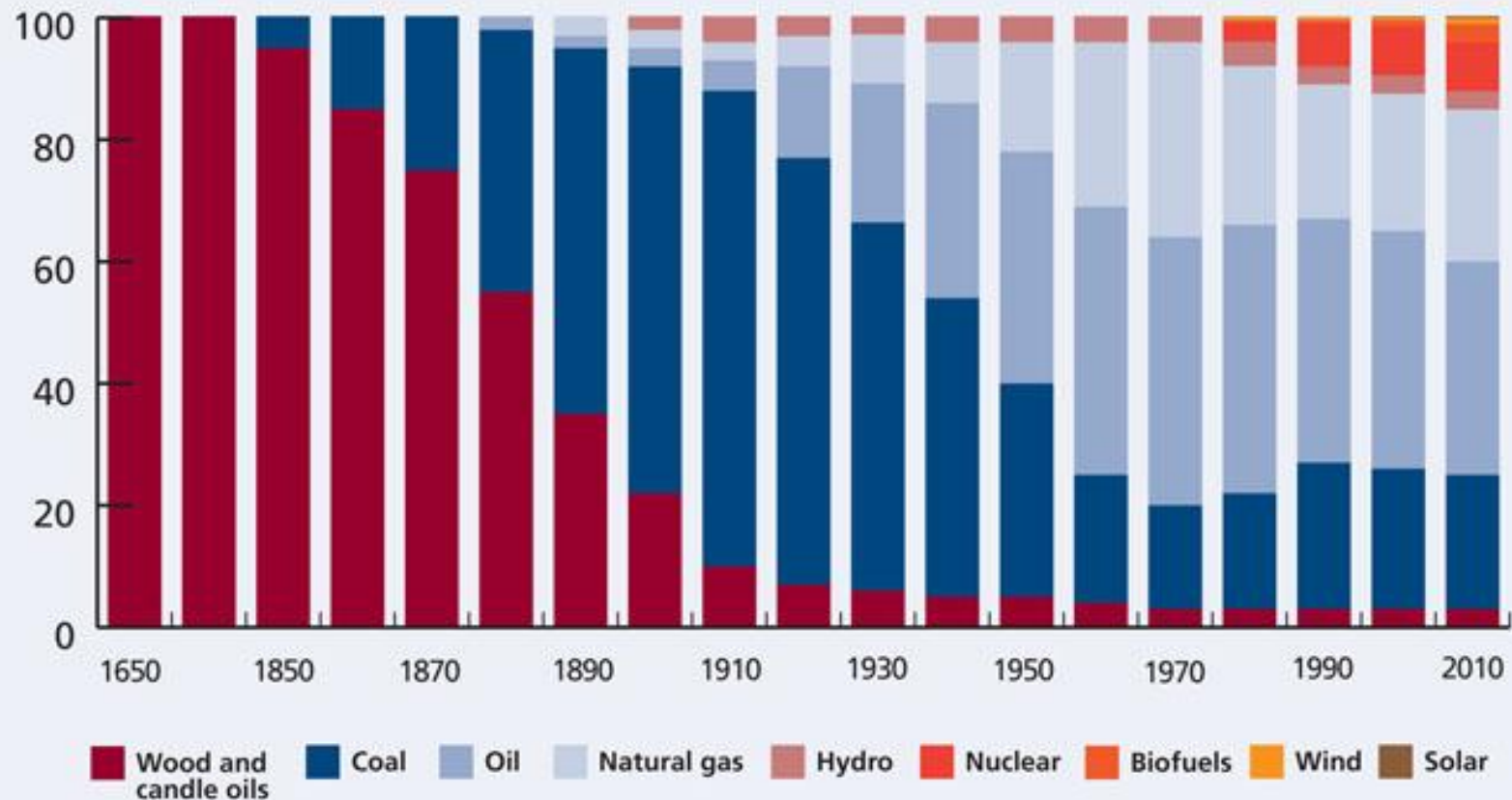


Good Policy for Green Energy Or Political Boondoogle

**November 17
2011 Kentucky Agricultural Summit**

**Don McCabe
Soil Conservation Council of Canada President
Ontario Federation of Agriculture Vice President**

Figure 9: Energy mix over time (%)

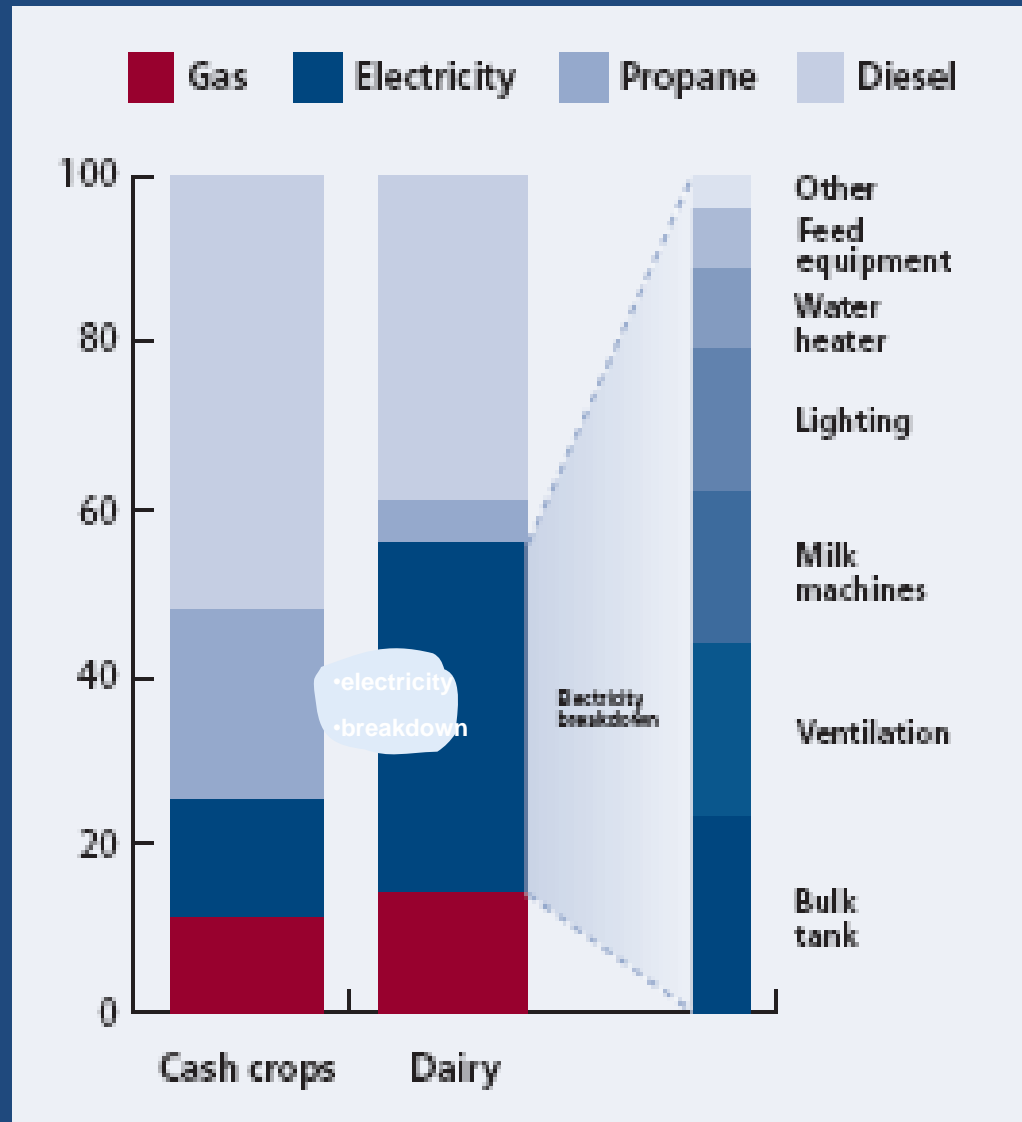


What's next? From sun to horsepower, whale oil, wood, coal, oil and nuclear energy, what new innovations are waiting in the wings? Where will we be in 2025?

•Source: Adapted from Natural Resources Canada;

•The Economist. "The Power and the Glory – a special report on energy", June 21, 2008 and Tertzakian p. 166

The energy bill of two farm types



Ontario's Green Energy and Green Economy Act, 2009

- Legislation creates a new electricity paradigm for renewable energy:
 - Streamlined permitting and approvals process
 - Priority connection – “Right to Connect”
 - Fixed price contracts for power production
 - Ownership opportunities for private sector, municipalities, utilities, aboriginal and community groups
- Creates lots of opportunities for the agricultural sector

FIT Price Schedule

Renewable Fuels	Capacity Range	Price (¢/kWh)
On Farm Biogas *	≤ 100 kW	19.5
On Farm Biogas *	> 100 kW ≤ 250 kW	18.5
Biogas *	≤ 500 kW	16.0
Biogas *	> 500kW ≤ 10 MW	14.7
Biogas *	> 10 MW	10.4
Biomass *	≤ 10 MW	13.8
Biomass *	> 10 MW	13.0
Landfill gas *	≤ 10 MW	11.1
Landfill gas *	> 10 MW	10.3
Rooftop Solar PV	≤ 10 kW	80.2
Rooftop Solar PV	> 10 kW ≤ 250 kW	71.3
Rooftop Solar PV	> 250 kW ≤ 500 kW	63.5
Rooftop Solar PV	> 500 kW	53.9

OFA Principles to Green Energy

- All farmers are energy users, not all farmers are energy providers
- No technology is the silver bullet. Farms need to weigh the options to their business

Progress to Date

- Microfit
 - 11,000 connected or able to (35,000 apps in)
 - Aug 19 directive to move for connection
- Leases
 - Do your homework!
 - Talk to the neighbour!
- Wind
 - Setbacks and receptors
- Infrastructure
 - Capacity is an issue
 - This is the LONG TERM COST for our hydro bills
- Ownership
 - Community Power
- Stray Voltage

DEVELOPMENT OF AN INNOVATIVE AGRICULTURAL BIOMASS VALUE CHAIN FOR ONTARIO



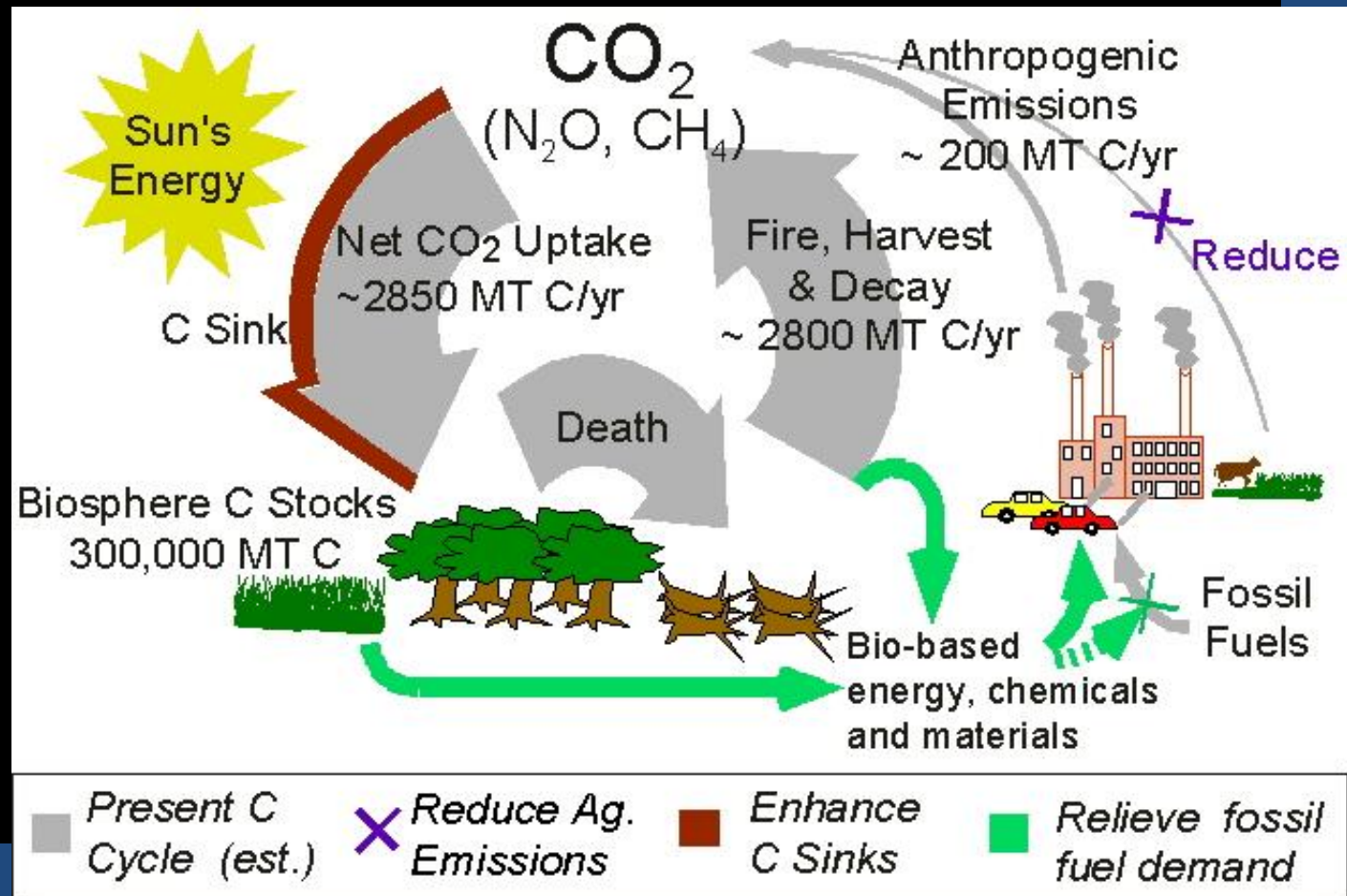
Definition of a Farmer

- Cash crop
- Corn, soybeans, wheat farmer
- Beef farmer
- Fruit and vegetable producer
- Egg producer
- Or.....

Definition of a Farmer

- Manager of carbon and nitrogen cycles to produce starch, oil, fuel, fiber and energy for world wide consumers at the highest quality.

•The Canadian Biosphere



Capturing Environmental Value

- Photosynthesis



- Carbon Sequestration

- Plant material (seed, straw, biomass)
 - Soil organic matter

Presentation Outline

- Who are the “links” (OFA, OPG, OPA)?
- Government Policy Decisions
- Market Needs
- Producer Needs
- Initial Actions
- Stay Tuned!

Who is The OFA?

- Largest General Farm organization in Ontario
- Approximately 38,000 farmers from Ontario
- OFA represents 9 out of 10 Ontario farmers
- Resolutions set policy
- Resolutions come from 52 counties affiliated with OFA

THE FARMER LINK

Who wants this stuff?

- Ontario Power Generation
 - Coal to be phased out by 2014
 - OPG wants to deal with an aggregated supply
 - 2mT for a start at Nanticoke and Lambton
- 2mT = 54,000 truck loads = 22,000 rail cars
= 80 ships

Who wants this stuff?

- Ontario Power Generation
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2mT = 54,000 truck loads = 22,000 rail cars
= 80 ships

Note that OPG has 19,000 MW of power capacity with all of its facilities (hydro, thermal and nuclear)

Thermal Facilities



Lambton 950 MW



Nanticoke 2760 MW

Who wants this stuff?

- Ontario Power Generation
 - Coal to be phased out by 2014
 - 2mT for a start at Nanticoke and Lambton

2mT = 54,000 truck loads = 22,000 rail cars
= 80 ships
- Cement plants (Lafarge)
- Greenhouse industry
- Home owners?
- Exports to Europe (B.C. wood pellets)
- District Combined Heat and Power?

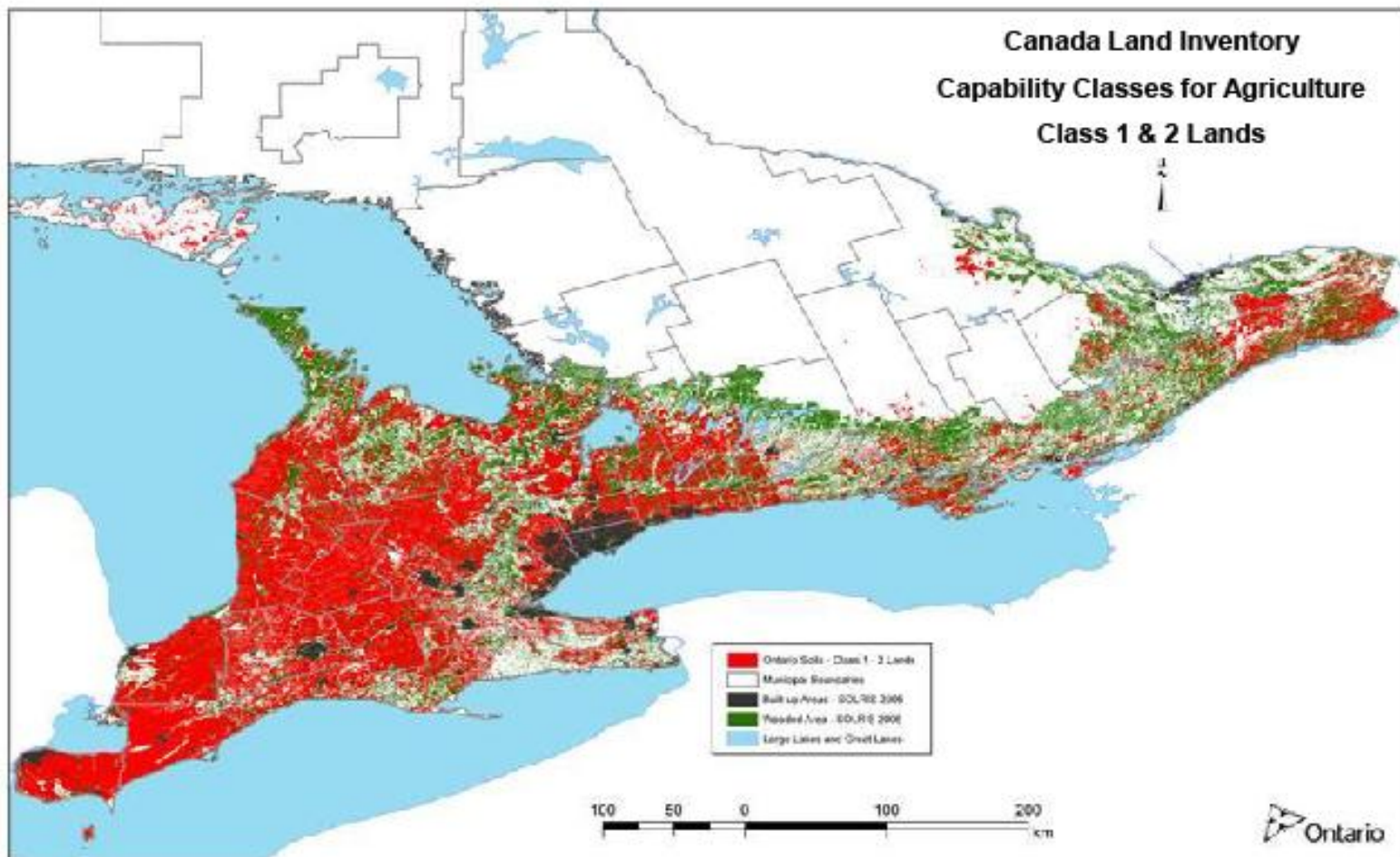
THE MARKET LINK

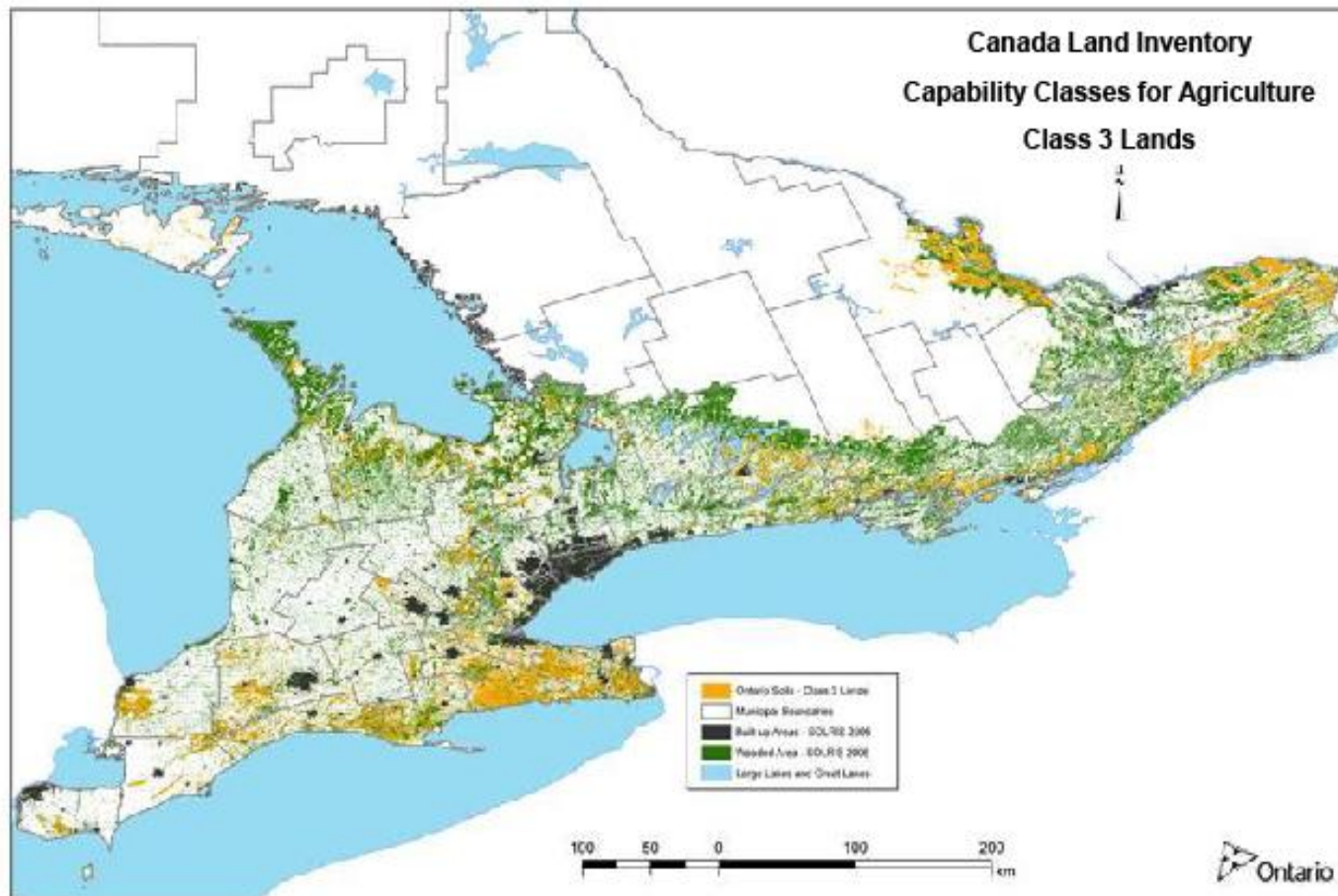
Biomass Fuel Map

- Nanticoke/Lambton Generation Facilities
- Lumber and Pulp Facilities



**Canada Land Inventory
Capability Classes for Agriculture
Class 1 & 2 Lands**

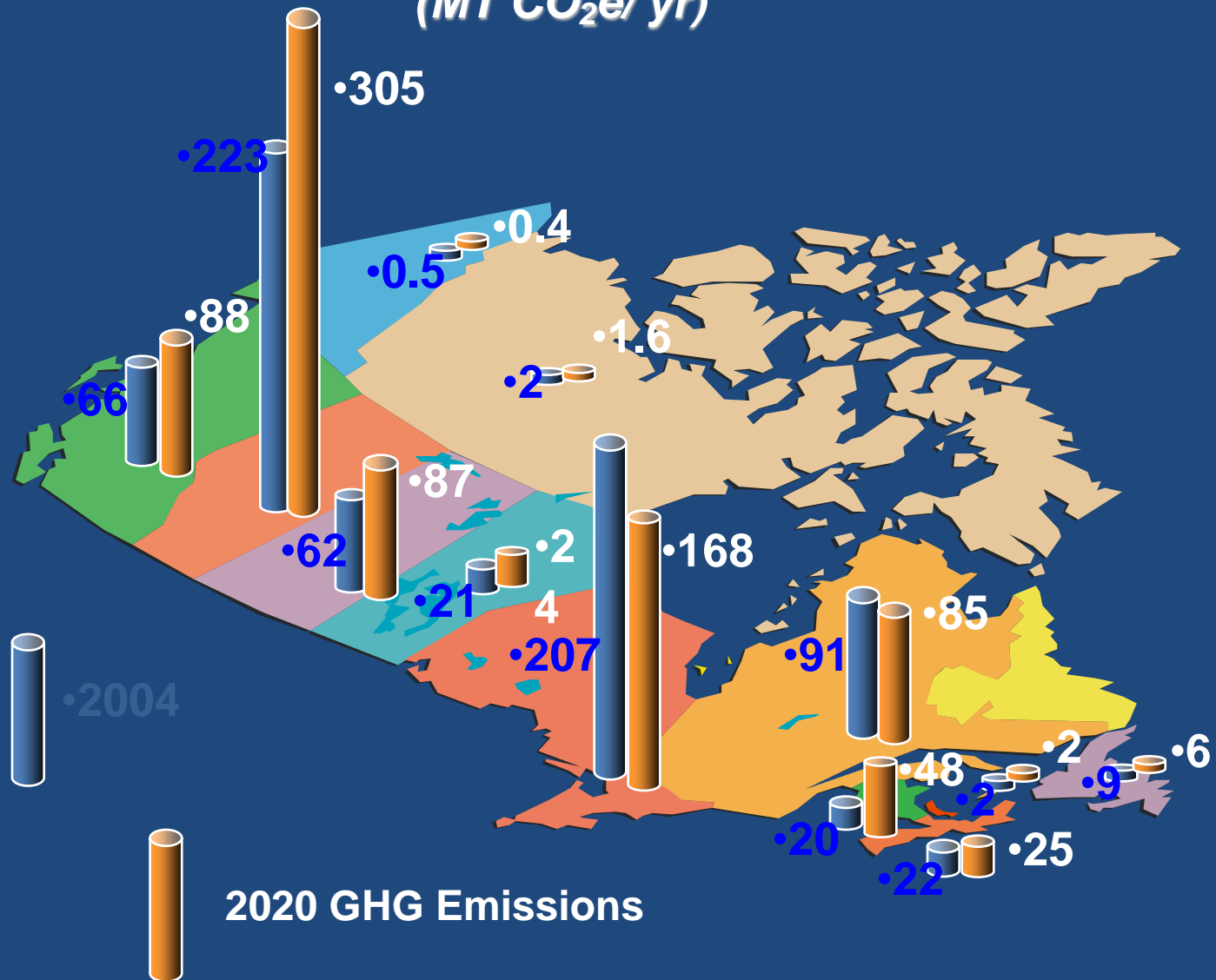




What caused this?

GHG Emissions in the Canadian Context

(MT CO₂e/ yr)



The Government Role

Ontario Environmental Protection Act →

“The owner and the operator of each of the following generating stations shall ensure that coal is not used to generate electricity at the generating station after December 31, 2014:

1. Atikokan Generating Station (wood pellets)
2. Lambton Generating Station
3. Nanticoke Generating Station
4. Thunder Bay Generating Station

The Government Role

- This **directive is creating a large market for alternative fuel sources**, as these generating stations will be needed to supply electricity during peak consumption periods.
- OPG expects that the use of existing assets with new fuel will be economically viable in comparison to other alternatives.
- OPG will consider biomass provided that it is available and economically viable.

MARKET NEEDS

Ontario's Feed-in Tariffs

- Differentiated by Size & Technology
- Differentiated by Application
- Tariffs Based on Cost of Generation
 - Plus Reasonable Profit
- No Program Cap (Bring It On!)
- This program is primarily implemented by the Ontario Power Authority (OPA) on behalf of the government

The Government Role

- OPA implements the long term energy plan for the Ontario government
- OPG has to get its market signal from the government , or any other electricity generator

THE POLICY LINK

Project Overview

The Opportunity

- Could be truly transformative for Ontario agriculture,
- Creating a new industry involved in the harvesting and storing of purpose-grown biomass
- For energy production and new uses.
- The amount of agricultural land required could approach 250,000 acres and have a farmgate value of \$150,000,000.

FARMER NEEDS

Triple Bottom Line Answers

- SHOW ME THE MONEY
- KISS (logistics)
- Information (agronomics)
- Risk Mitigation (long term contracts)
- Policy (Ontario only feedstock supply, food versus fuel, land use change, competitive)

Gross versus Real Supply

- Farmers will need to know how much can be removed (Literature review and research)



Role of Research Partners



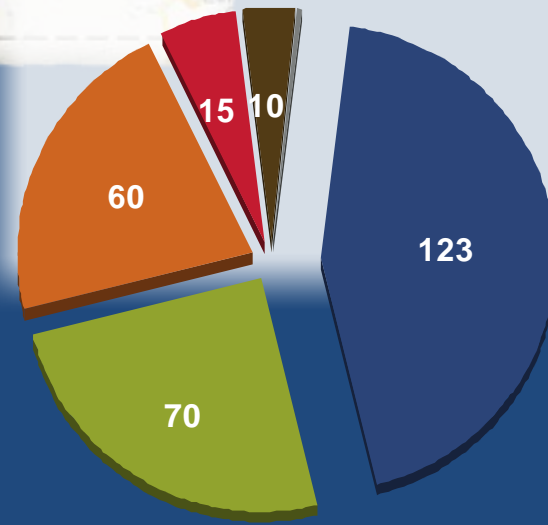
- Agronomic – Field-scale – *Farmer Experience*
- Agronomic – Research – *Qualify & Quantify*
- Processing, Aggregations & Logistics
- Burn Suitability – *PRICE!*
- Funding Partner

•Spring 2010



Acres Planted

- Miscanthus
- Switchgrass
- Polyculture
- Big Bluestem
- Indian Grass
- Hemp



	County	Crop	Acres	Total Acres
2010	Essex	Miscanthus (3 varieties)	200.0	200
	Kent	Miscanthus (2 var), Switchgrass (2 var), Polyculture	57.0	257
	Wellington	Miscanthus (propagation stock)	140.0	397
	Norfolk	Native Polyculture/Miscanthus	49.6	447
	Grey	Switchgrass	26.4	473
	Perth	Miscanthus	10.0	483
	Hastings	Switchgrass, Miscanthus, Hemp	0.8	484
	Lambton	Bluestem, Indian grass, Switchgrass	46.7	531
	Prince Edward	Switchgrass, Miscanthus	76.0	607
2011 (A)	Grey	Switchgrass (3 varieties)	11.0	618
	Oxford	Switchgrass, Miscanthus	24.0	642
	Dundas	Switchgrass	35.0	677
	Elgin	Polyculture	19.0	696
2011 (B)	Kent	<i>Switchgrass, Indian/Switchgrass, Polyculture</i>	78.0	774
	<i>Norfolk</i>	<i>Polyculture, Miscanthus (propagation)</i>	50.0	824
	<i>Rainy River</i>	<i>Miscanthus (2 varieties)</i>	21.5	845
	<i>Oxford</i>	<i>Miscanthus, Switchgrass, Polyculture</i>	30.0	875
	<i>Huron</i>	<i>TBA</i>	25.0	900

INITIAL RESULTS

**LITERATURE REVIEW AND STUDY
ECONOMIC IMPACT ASSESSMENT
COMMERCIALLY GROWN BIOMASS IN ONTARIO
AND MARKET POTENTIALS**

17 February 2011©



AGRICULTURAL BIOMASS POWER CHALLENGES

DIFFICULT TO COMPETE WITH:

HIGH AGRICULTURAL COMMODITY PRICES

WHY GROW UNKNOWN ENERGY CROPS, GRAINS ARE EASY

DECLINING NATURAL GAS PRICES

MAKE BIO-COMBUSTIBLE OUTPUTS HARD TO JUSTIFY

LOWER COST BATTERY/FUELCELL/ULTRA CAPACITOR SYSTEMS THAT OPTIMIZE TRADITIONAL GENERATION

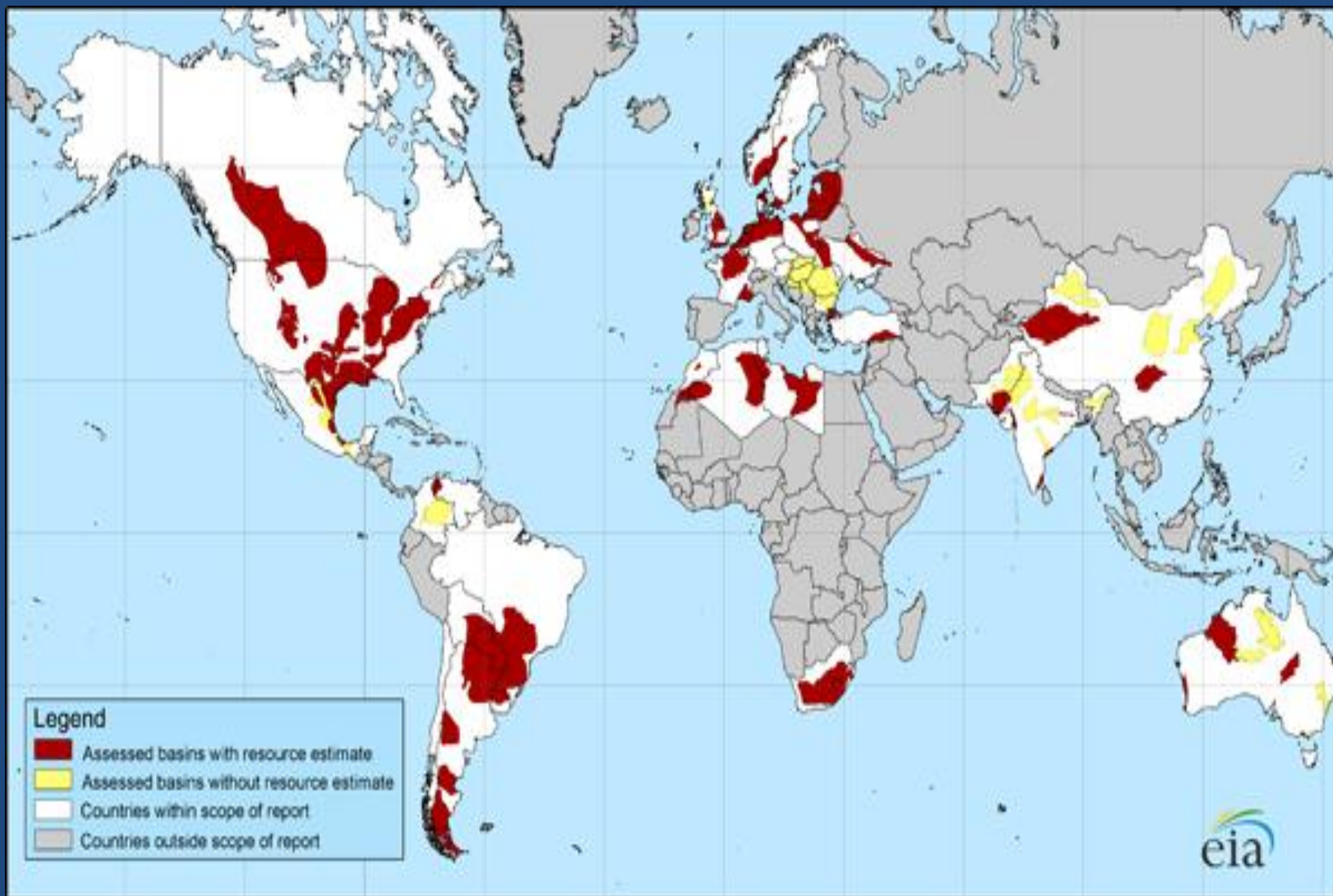
ENABLES RENEWABLES - OUTPUT SMOOTHING, EXCURSION CONTROL,
CURTAILMENT CAPTURE

HIGHER PRICES CUT BOTH WAYS - ENCOURAGES BIOMASS WHILE:

ENCOURAGES MORE EXPLORATION, NEW RECOVERY TECHNOLOGIES

ENCOURAGES OTHER NON-FOSSIL FUEL FORMS - TEG, SOLAR, CHP

CONSERVATION

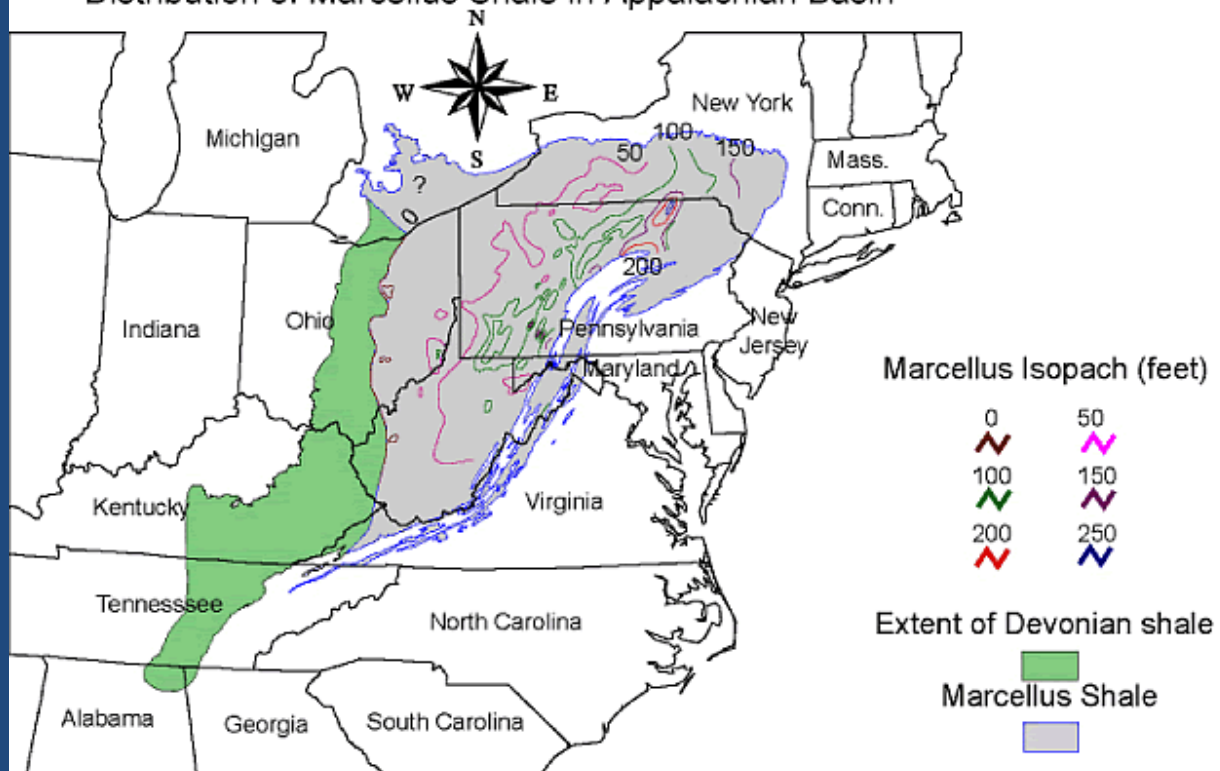


•Map of 48 major shale gas basins in 32 countries

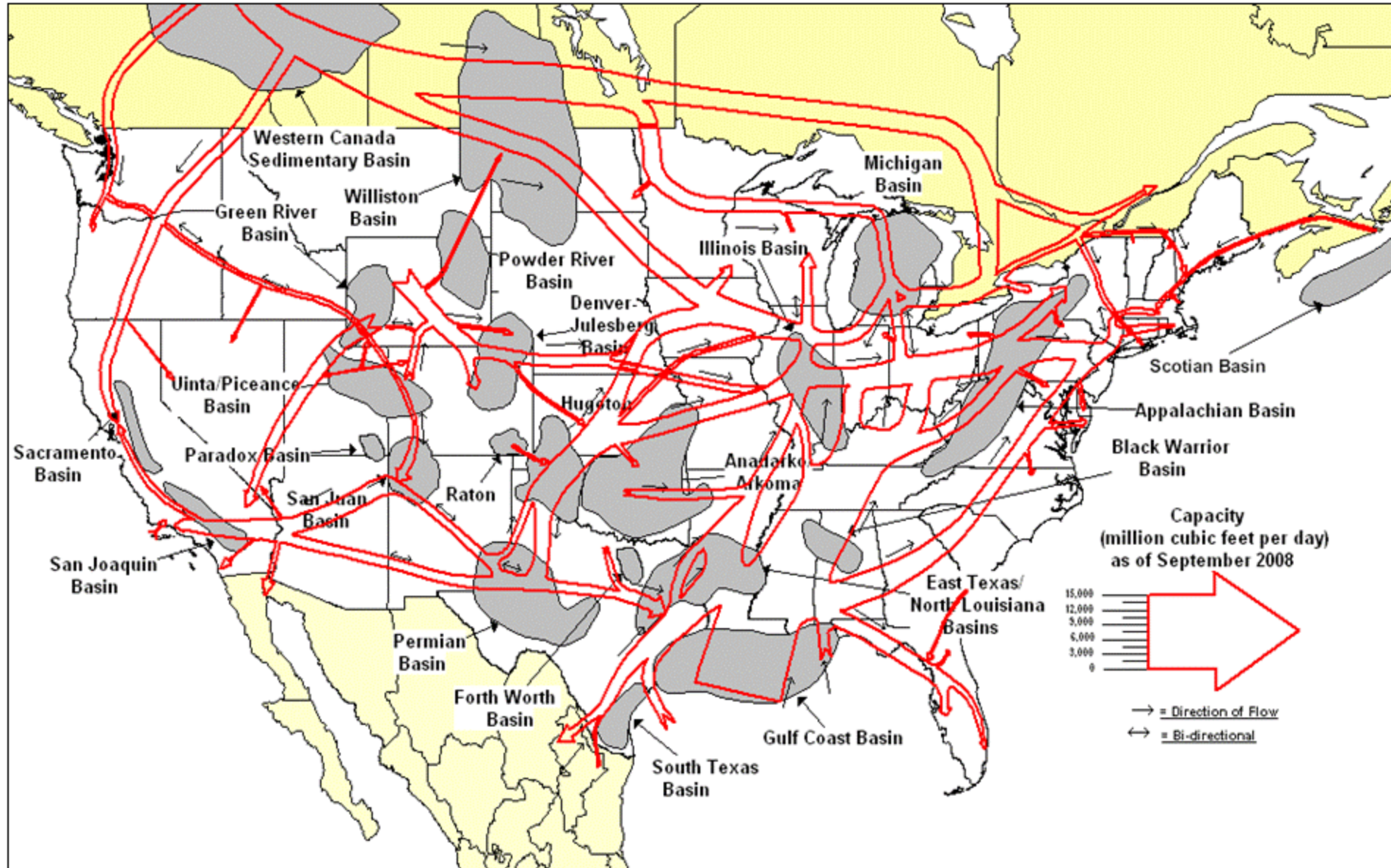
Shale Gas Plays, Lower 48 States



Distribution of Marcellus Shale in Appalachian Basin



Milici, 2005



Source: Energy Information Administration, Office of Oil and Gas, Natural Gas Division, GasTran Gas Transportation Information System.

The EIA has determined that the informational map displays here do not raise security concerns, based on the application of the Federal Geographic Data Committee's *Guidelines for Providing Appropriate Access to Geospatial Data in Response to Security Concerns*.

Sustainability of a Value Chain

- Natural gas for direct use or for electricity generation is a huge competitor for next 20 years or more
 - Bio-energy will require prices 3 times that of natural gas and 20 year supply contracts to justify investments
- Life Cycle Analysis on basis of fuel equivalency is required throughout the value chain from planting to end use

AGRICULTURAL BIOMASS POWER CHALLENGES

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CONSERVATION

AGRICULTURAL BIOMASS POWER CHALLENGES
BIOMASS MARKETS/BIOREFINERY ISSUES

FUELS (GASES) - ANAEROBIC DIGESTION

CHP

HENG

FUELS (LIQUIDS) - CELLULOSICS

ETHANOL

BIO-DIESEL

BIO-CHEMICALS - FICHER TROPSCH

AMMONIA

BIO-OILS

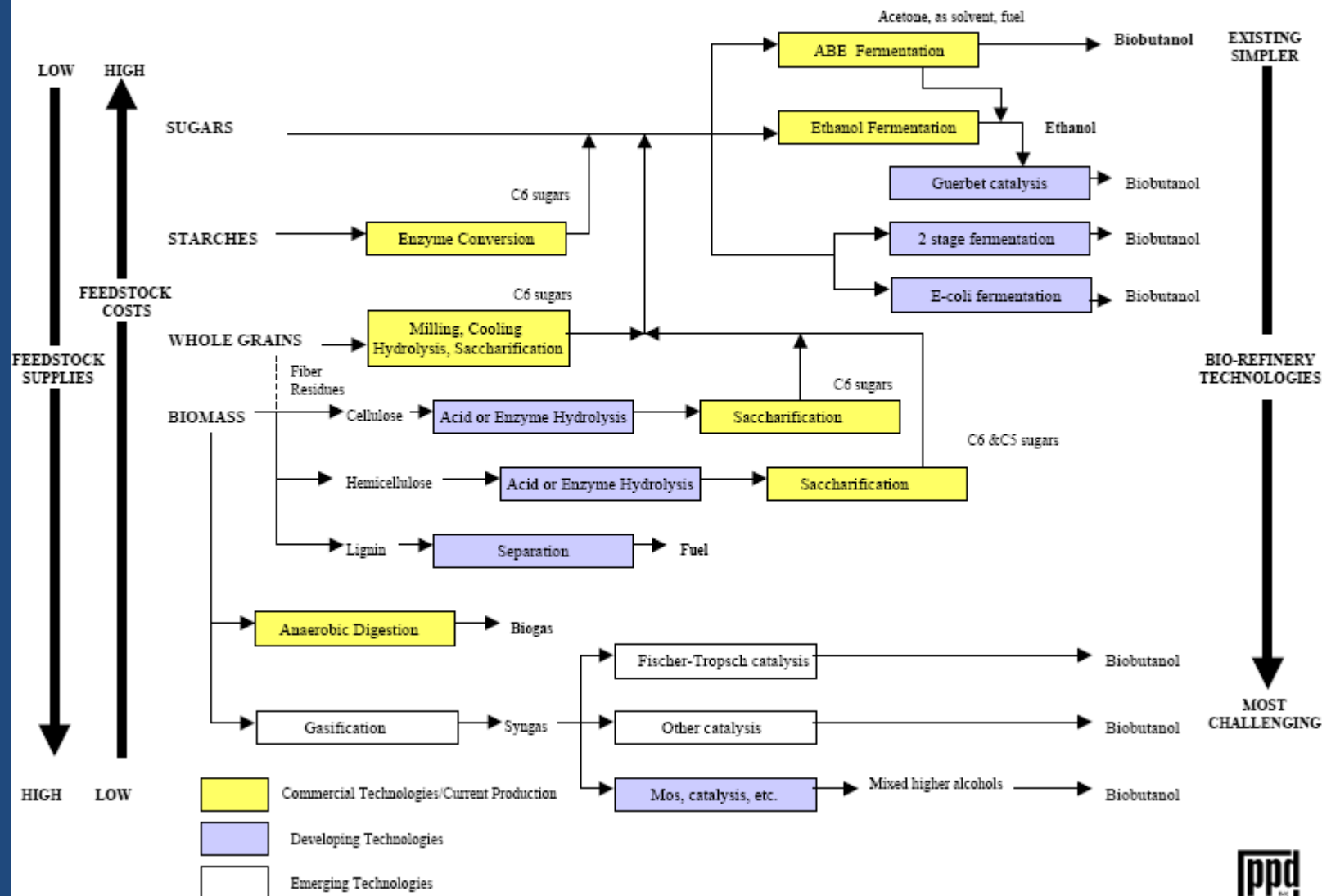
BIO-MATERIALS - SLUSH

PACKAGING

MOULDING

BIOMASS BIO-REFINERY CONCEPT

CURRENT AND EMERGING BIO-ENERGY CONVERSION TECHNOLOGIES



AGRICULTURAL BIOMASS POWER CHALLENGES

CRITICAL ISSUES:

100% SUPPLY CHAIN RELIABILITY

HIGH QUALITY, CREDIT WORTHY VALUE-CHAIN

SUPPLIERS MUST HAVE A TRACK RECORD

SUPPLIERS MUST PROVIDE A GUARANTEE OF DELIVERY

CONTRACT PRODUCTION

MAXIMIZE BTU'S PER ACRE

BTU PRICE PREMIUM SCALE

PRE/POST COMBUSTION PHYSICAL AND CHEMICAL CHARACTERIZATION

PRODUCTION LEAD-TIME

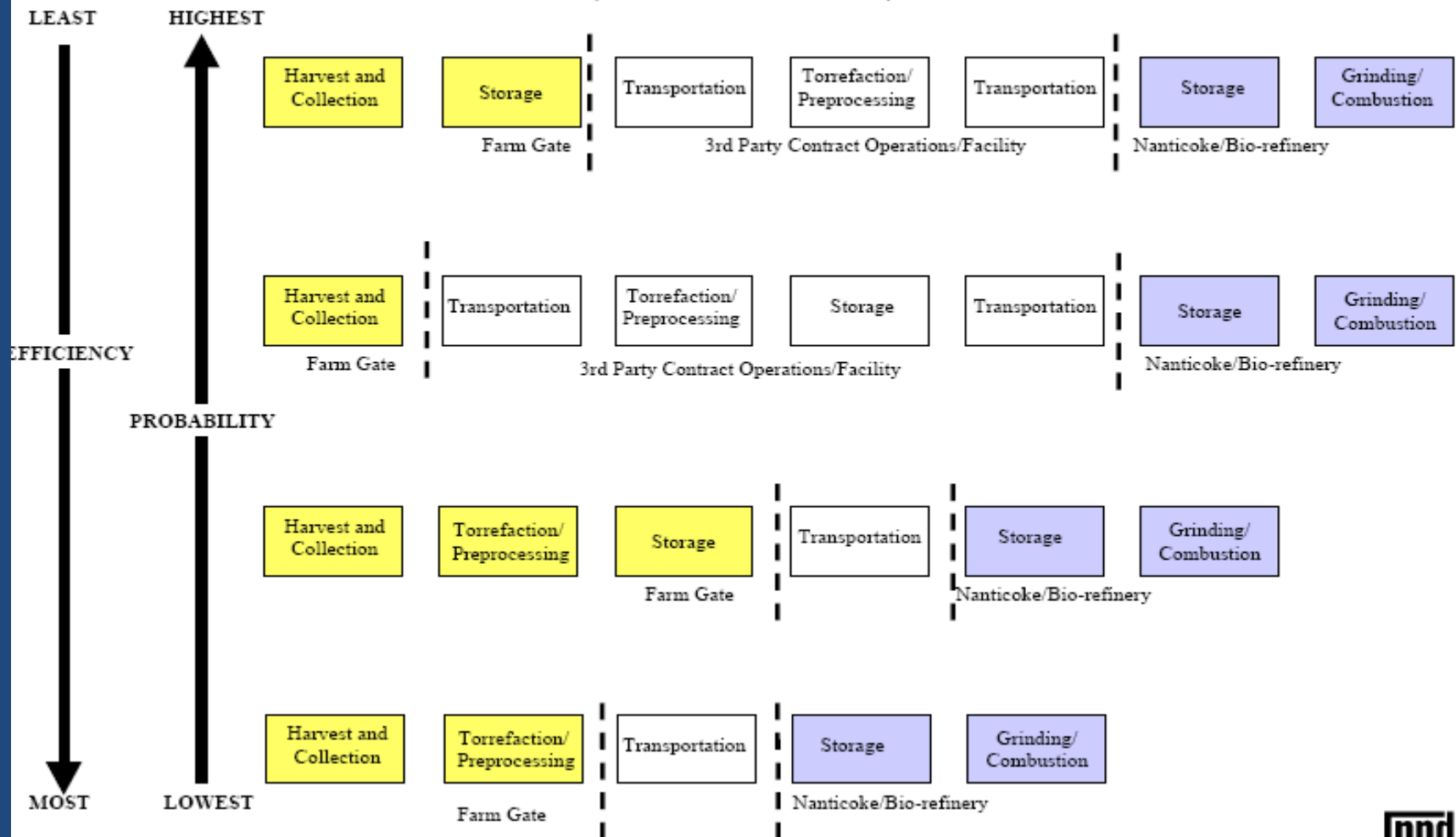
STORAGE LIFE



Potential Markets

- New markets are dependant on conversion technologies
 - Torrifaction for combustion markets
 - Pyrolysis / Gasification for bio-oils
 - Anaerobic digestion (AD) for biogas
 - Nutrient extraction for clean fuel properties and specialized markets
- Other than AD, other technologies are in development stages
 - Biogas can be transported as electricity or as a fuel and can address peak electricity production or gas supplies in remote areas
 - Pyrolysis may be the most flexible and straight forward for farm application in the future and support many bio-economy markets
 - Growth in other green technologies indicate that 2nd or 3rd generation technologies are required to achieve sustainability

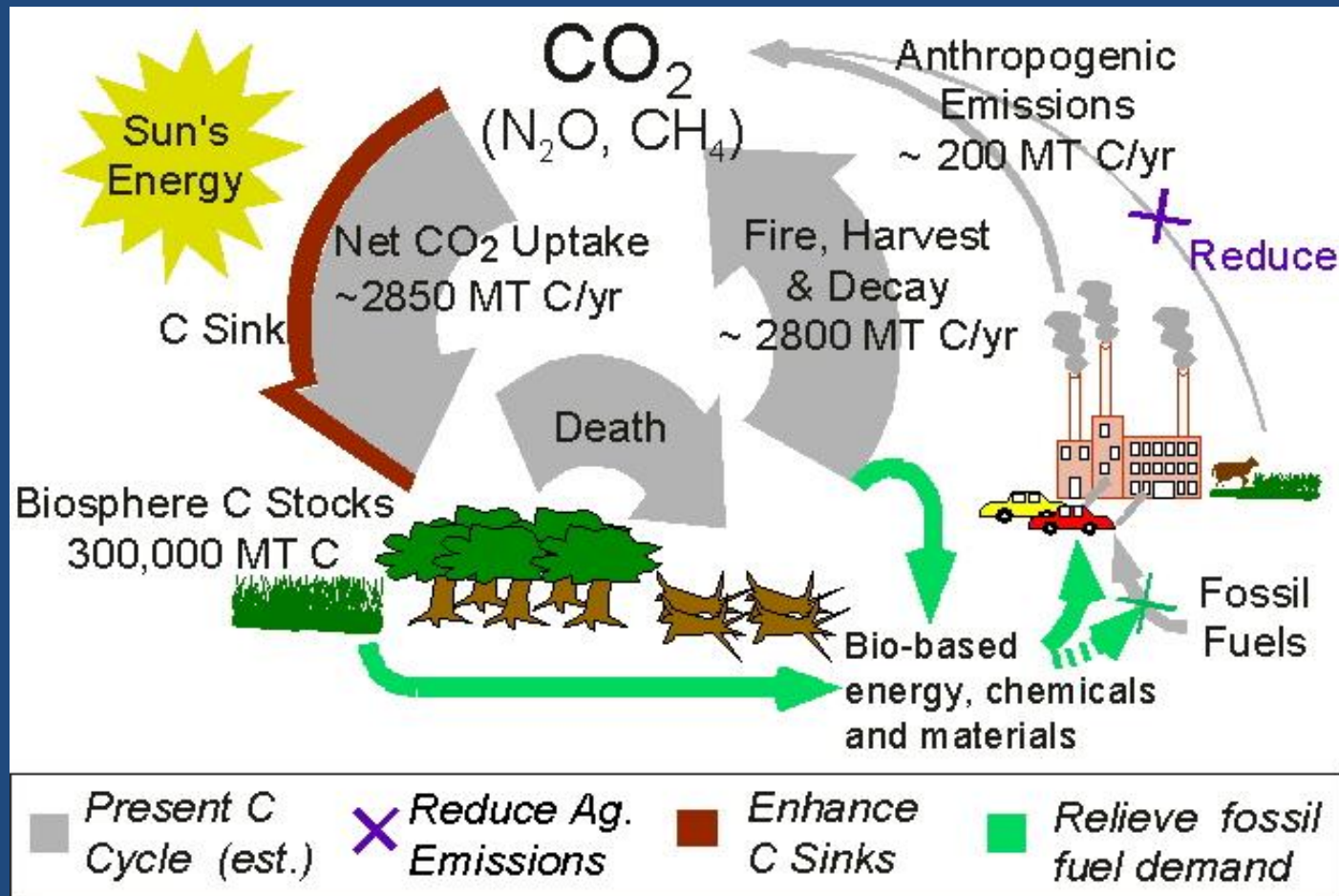
AGRICULTURAL BIOMASS POWER CHALLENGES VALUE CHAIN TERMS OF SALE, PRODUCT FLOW, LOGISTICS OPTIONS



PATH FORWARD

- Knowing what we know now, where should we focus our efforts in supporting the value chain development?
- 2 Options
 - Continue as planned to have biomass for combustion
 - Alter the course to support promising technologies that are game changers for producers

•The Canadian Biosphere



Ontario Farmers

What other industry sucks up “toxic” CO₂ while releasing O₂, reburying dinosaur ghosts (C sequestration), putting food on the table here and abroad, heat in the house, fuel and parts in the car, clothes in the closet, habitat for critters, and a whole bunch of other “environmental goods and services”?

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What other industry sucks up “toxic” CO₂ while releasing O₂, reburying dinosaur ghosts (C sequestration), putting food on the table here and abroad, heat in the house, fuel and parts in the car, clothes in the closet, habitat for critters, and a whole bunch of other “environmental goods and services”? **And now we want to help keep the lights on!**

Thank You